AMENDMENTS TO THE CLAIMS:

This listing of claims replaces all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (Currently Amended) An apparatus for detecting a variation in a probe, comprising:

~~a probe which is adapted to undergo one or more of a thermoelastic, thermoelectric or thermomagnetic excitation response~~ a sensor comprising a substrate and a plurality of thin film probe structures attached to a surface of the substrate, each probe structure being adapted to undergo a thermoelastic response when excited by temporally varying electromagnetic radiation, the ~~excitation~~ thermoelastic response being a function of ~~the~~ physical and/or chemical properties of the probe structure and~~/or of~~ a sample material binding thereto;

a source of electromagnetic radiation;

means for directing the electromagnetic radiation at ~~the~~ each probe structure of the sensor; and

a transducer adapted to determine ~~the excitation~~ a thermoelastic response of ~~the~~ each probe structure.

2 to 57. (Canceled)

58. (New) The apparatus of claim 1 wherein the sensor is in the form of a plate.

59. (New) The apparatus of claim 1 wherein the substrate is electromagnetically transparent.

60. (New) The apparatus of claim 1 wherein the substrate acts as, or is part of, the transducer.

61. (New) The apparatus of claim 1 wherein the substrate is of such a thickness that the substrate has sufficient strength for ease of handling, and also that the substrate will permit a desired amount of electromagnetic radiation to pass through the substrate.

62. (New) The apparatus of claim 61 wherein the substrate has a thickness in a range of 0.2 to 1.0 mm.

63. (New) The apparatus of claim 1 wherein the sensor comprises a plurality of probe structures, each of the probe structures being adapted to undergo a localized electrical response when the probe structure is excited by temporally varying electromagnetic radiation and to generate an electrical output response corresponding thereto, characteristics of the electrical response being a function of physical or chemical properties of each probe structure and sample material binding thereto, and

a transducer for transmitting the electrical response.

64. (New) The apparatus of claim 63 wherein different probe materials are bound to different probe structures.

65. (New) The apparatus of claim 1 in which each probe structure has a substrate surface onto which is bound probe material.

66. (New) The apparatus of claim 65 in which the substrate comprises a thin film.

67. (New) The apparatus of claim 1 in which the plurality of thin film probe structures are formed in an array.

68. (New) The apparatus of claim 1 in which each probe structure comprises probe material which is different from material of other probe structures.

69. (New) The apparatus of claim 68 in which the probe material comprises molecules of one type.

70. (New) The apparatus of claim 68 in which the probe material comprises a mixture of different molecules.

71. (New) The apparatus of claim 1 in which a surface of the substrate is planar.

72. (New) The apparatus of claim 1 in which a surface of the substrate is curved.

73. (New) The apparatus of claim 1 in which the source of electromagnetic radiation emits radiation in the optical portion of the electromagnetic spectrum.

74. (New) The apparatus of claim 1 in which the source of electromagnetic radiation comprises a laser.

75. (New) The apparatus of claim 68 in which the source of electromagnetic radiation is positioned so that the radiation impinges directly on the probe material.

76. (New) The apparatus of claim 68 in which the source of electromagnetic radiation is positioned so that electromagnetic radiation first passes through a substrate transparent to the electromagnetic radiation before impinging on the probe material.

77. (New) The apparatus of claim 1 in which the source of electromagnetic radiation emits temporally varying electromagnetic radiation in the optical spectrum.

78. (New) The apparatus of claim 77 in which the substrate is formed from an optically transparent medium, and in which the source of electromagnetic radiation is adapted to direct the electromagnetic radiation to a lower surface of a probe structure via the substrate.

79. (New) The apparatus of claim 78 in which the probe structures are each adapted to absorb electromagnetic radiation to thereby generate a thermoelastic response in the form of a volume change within a probe structure, and in which the transducer comprises means for detecting the volume change.

80. (New) The apparatus of claim 1 in which each probe structure comprises a thin film metal spot.

81. (New) The apparatus of claim 1 in which the transducer comprises means for receiving reflected electromagnetic energy from a selected probe structure.

82. (New) The apparatus of claim 78 in which the probe structures are each adapted to absorb electromagnetic radiation to thereby generate a thermoelastic response in the form of a lateral displacement of a corresponding probe structure, and in which the transducer comprises means for detecting the lateral displacement.

83. (New) The apparatus of claim 82 in which the probe structures each comprise a thin film dielectric material spot.

84. (New) The apparatus of claim 1 in which the probe structures comprise a transducer element for generating an electrical output signal representative of a thermoelastic response of said probe structures.

85. (New) The apparatus of claim 1 in which the source of electromagnetic radiation comprises a laser adapted to irradiate selected ones of the probe structures with pulsed or continuous wave electromagnetic radiation.

86. (New) The apparatus of claim 1 in which the transducer comprises an optical interferometer for receiving a reference beam from an optical source, and an interference beam reflected from a probe structure.

87. (New) The apparatus of claim 1 in which the transducer includes a transient recorder or digitizing oscilloscope for determining an amplitude and phase variation in thermoelastic response signals received from the probe structures.

88. (New) The apparatus of claim 1 in which the source of electromagnetic radiation and the transducer include means for detecting a change in resonant frequency of a selected probe structure.

89. (New) The apparatus of claim 1 in which each probe structure includes an entrant electrode adapted to provide a ground plane to a lower surface of the substrate.

90. (New) The apparatus of claim 1 further comprising a molecular probe material bound to an exposed surface of a probe structure.

91. (New) The apparatus of claim 1 in which the substrate comprises a disc, and further comprising:

drive means for rotating the disc relative to an axis;

indexing means for varying a position of said electromagnetic excitation means and said detection means relative to said axis.

92. (New) The apparatus of claim 58 in which the substrate comprises silica.

93. (New) The apparatus of claim 58 in which the probe structures each comprise a thin film metal spot.

94. (New) The apparatus of claim 58 in which the probe structures each comprise a thin film dielectric spot.

95. (New) The apparatus of claim 58 in which each probe structure further includes a transducer element for generating an electrical output signal representative of the thermoelastic response of said probe structure.

96. (New) The apparatus of claim 1 in which the probe structures are arranged in a series of generally circular or helical arrays on a circular disc substrate.

97. (New) A method of using an apparatus,

wherein the apparatus comprises:

a sensor comprising a substrate and a plurality of thin film probe structures attached to a surface of the substrate, each probe structure being adapted to undergo a thermoelastic response when excited by temporally varying electromagnetic radiation, the thermoelastic response being a function of physical and/or chemical properties of the probe structure and a sample material binding thereto;

a source of electromagnetic radiation;

means for directing the electromagnetic radiation at each probe structure of the sensor; and

a transducer adapted to determine a thermoelastic response of each probe structure; and

wherein the method comprises:

providing a plurality of probe materials respectively attached to the plurality of thin film probe structures;

exposing the thin film probe structures to a sample material to permit binding of material to surfaces of the thin film probe structures;

using the source of electromagnetic radiation to direct electromagnetic energy at the thin film probe structures; and

detecting changes in thermoelastic response of each thin film probe structure to the electromagnetic energy by comparing a thermoelastic response with and without exposure to the sample material.